2016

[UPPER ROANOKE RIVER WATERSHED CLEANUP PLAN: NORTH FORK AND SOUTH FORK ROANOKE RIVERS WATERSHED (PART II)]

JULY 14, 2016

MEADOWBROOK COMMUNITY CENTER
SHAWSVILLE, VA

TMDL Studies establish the goals for sediment and bacteria reduction. The Clean-up Plan is the "road map" to meet those water quality goals!

- **Proposed Residential Waste Treatment BMPs**
  - GIS based analysis was performed using the provided building layers, sewer networks, and stream networks to update the number of houses in each watershed on sewer, septic, and possible straight pipes.
  - The data provided by Montgomery County specified whether the building was on septic or sewer. Houses were assumed to be on septic unless noted otherwise in the Montgomery County layer or in the GIS analysis.
  - To estimate the number of homes on sewer a GIS analysis was performed using the sewer lines and building layers. Only homes adjacent to a sewer line were considered to be on sewer.
  - The buildings layer data was received from Floyd County after the initial analysis. The additional houses in Floyd County counted using this data were assumed to be on septic.
  - Straight pipes were estimated using the percentages listed for Montgomery County in the TMDL (0.45% of houses within 200 feet of the stream).

Table 5-6: Proposed Sewage Disposal BMPs (systems)

BMP	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Total
Total Septic Pump-out (RB-1)	58	203	416	31	71	779
Sewer Connection (Target Areas and RB-2)	N/A	25	11	N/A	13	49
Total Septic Repair (RB-3)	8	27	56	4	9	105
Total Septic Install /Replace (RB-4, RB-4P)	9	30	62	4	10	116
Total Alternative Waste Treatment System (RB-5)	2	6	12	1	2	23

- **Pet Waste BMPs**
  - ArcGIS was used to determine locations of pet friendly hotels, schools, and recreational areas that could be prime locations for pet waste stations.
  - Each pet waste station costs at $4,180, which covers the cost of maintenance for a period of five years.
  - Each pet waste education program costs at $5000.

Proposed Pet Waste Station Locations		
Subwatershed	**Location Type**	**Location**
North Fork Roanoke River	Hotel	Super 8 Christiansburg
		Quality Inn Christiansburg
	Park	Wayside Park
South Fork Roanoke River	Hotel	Interstate Overnight RV Park
		Days Inn Christiansburg
	Neighborhood	Boggs Mountain Loop-Weeping Willow Ln
	Park	Eastern Montgomery Park
	Restaurant	Cracker Barrel
Wilson Creek	Apartment	Cascades Point Apartments
		The Mill at Blacksburg Apartments
		Cedarfield Apartments and Townhomes
	Hotel	Shayona Inn
		Econo Lodge
		Days Inn Blacksburg
		Comfort Inn Blacksburg
	Park	Mid-County Park - parking lot
		Ellet Valley Recreational Area
		Cedar Hill Park
		Nellies Cave
		Sunrise Park
		Golden Hills Disc Golf Course at MidCounty Park
	Trail	Mid-County Park - nature trail loop system

Table 5-7: Proposed Pet Waste BMPs (units)						
BMP	**Bradshaw Creek**	**North Fork Roanoke River**	**South Fork Roanoke River**	**Unimpaired North Fork Roanoke River**	**Wilson Creek**	**Total**
Pet Waste Education Campaign	1	1	1	Included in North Fork Roanoke River campaign	1	4
Pet Waste Composter	11	43	87	6	98	243
Pet Waste Station	0	3	6	1	15	25

Existing Stormwater BMPs:

- We appreciate the BMP information provided by the localities!
- Table 5-8 presents the existing stormwater BMP summary for each subwatershed. Reductions quantified from existing BMPs based on the reported drainage areas (conservative approach).
- Table 5-8 also presents the bacteria and sediment reductions from existing BMPs.

Table 5-8: Existing Stormwater BMP Summary						
Stormwater BMP	**North Fork Roanoke River**		**South Fork Roanoke River**		**Wilson Creek**	
	Number	Acres Treated	Number	AcresTreate	Number	Acres Treated
Bioretention	1	0.34	-	-	25	11
Detention	8	29	9	39	44	192
Extended Detention	1	3	-	-	5	16
Infiltration	1	1	-	-	1	0
Manufactured BMP	-	-	-	-	4	2
Underground Detention	-	-	-	-	10	12
Vegetated Filter Strip	-	-	-	-	1	1
Water Quality Grass Swale	-	-	-	-	2	3
Wet Pond	2	21	1	52	1	0
Total	**13**	**54**	**10**	**91**	**93**	**236**
Bacteria Reduction From Existing BMPs (cfu/year)	2.08E+12		1.80E+12		4.10E+11	
Sediment Reduction From Existing BMPs (ton/year)	3.51		5.43		16.8	

- **Proposed Stormwater BMPs:**
  - The strategy was to evenly increase the number of BMPs until the needed bacteria reduction was met.
  - Bradshaw Creek's required developed land bacteria reduction is met by implementing a pet waste education program, but for grant funding purposes, a nominal coverage is proposed for each appropriate BMP.
  - A higher percentage of raingardens proposed in the subwatersheds of the North and South Fork Roanoke River (more rural and have less medium and high intensity development).
  - Urban riparian zones were estimated using the stream and landuse layer in ArcGIS.
  - Rain barrels were estimated for 25% of homes in each watershed.

Table 5-10: Proposed Stormwater BMPs (Acre-Treated)

	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Total
Bioretention	50	300	600	150	300	1,400
Rain Garden	50	300	700	150	300	1,500
Infiltration Trench	20	200	400	20	100	740
Manufactured BMP[1]	20	150	400	20	300	890
Constructed Wetland	20	200	500	20	300	1,040
Detention Pond	10	100	200	20	150	480
Cistern[2]	6	23	41	3	91	164
Permeable Pavement	5	5	5	5	5	25
Vegetated Swale	200	400	600	300	500	2,000
Rain Barrel[2]	174	694	1,243	91	2,736	4,938
Riparian Buffer (Forested)[3]	2-8	15-71	27-124	2-11	8-38	55-251
Riparian Buffer (Grass/Shrub)[3]	2-9	15-80	27-140	2-13	8-42	55-284

[1]Manufactured BMPs or manufactured treatment devices (also referred to as proprietary treatment devices) are commercial products fabricated in manufacturing facilities that provide stormwater pollution treatment. Some examples include hydrodynamic separators and filters. (Source: VA Stormwater BMP Clearinghouse).
[2]Units
[3]Acre-Installed (based on a range of buffer widths from 25-100 feet)

Table 5-9: Proposed Detention Pond Retrofits			
BMP	**North Fork Roanoke River**	**South Fork Roanoke River**	**Wilson Creek**
	Number	Number	Number
Infiltration Basin	3	4	9
Constructed Wetland	5	4	33

Table 5-11: Street Sweeping Programs - Existing and Proposed[1]					
Location	**Existing Program**		**Proposed Program**		**Total Annual Sediment Reduction (tons)**
	Average Miles Swept Annually	**Average Annual Sediment Reduction (tons)**	**Additional Miles Swept Annually**	**Annual Additional Sediment Reduction (tons)**	
Town of Blacksburg	542	150	542	150	299
Town of Christiansburg	37	3	404	34	37
Roads within Montgomery County	-	-	1,559	437	437
Roads within Roanoke County	-	-	455	250	250

- **Proposed Cropland BMPs:**
  - While it was established there is no manure spreading on cropland in the watershed (i.e. no bacteria reductions needed), there is still a sediment reduction to be met from cropland.

The general approach to cropland BMPs was to apply continuous no-till on an area of land, and in combination, have a small grain cover crop, and propose 5% of cropland have permanent vegetative cover, utilize sod waterway and cropland buffer/field borders each (for a total of 15% of cropland under these practices).

Table 5-5: Proposed Cropland BMPs (acres-installed)						
BMP	**Bradshaw Creek**	**North Fork Roanoke River**	**South Fork Roanoke River**	**Unimpaired North Fork Roanoke River**	**Wilson Creek**	**Total (acres-installed)**
Continuous No-Till (SL-15)	41	253	662	51	26	1,033
Small Grain Cover Crop (SL-8)	48	283	452	57	30	870
Permanent Vegetative Cover on Cropland (SL-1)	2	15	39	3	2	61
Sod Waterway (WP-3)	2	15	39	3	2	61
Cropland Buffer/Field Borders (CP-33 and WQ-1)	2	15	39	3	2	61

- **Proposed Livestock Exclusion BMPs:**
  - Livestock exclusion systems were determined through GIS analysis using aerial imagery, stream networks, landuse and discussions with SWCD personnel
  - The numbers presented in Table 5-3 represent the systems necessary to achieve the reductions in livestock direct loads.

Table 5-3: Proposed Livestock Exclusion BMPs (systems)						
BMP	**Bradshaw Creek**	**North Fork Roanoke River**	**South Fork Roanoke River**	**Unimpaired North Fork Roanoke River**	**Wilson Creek**	**Total**
CREP Livestock Exclusion (CRSL-6)	3	10	10	3	1	27
Livestock Exclusion with Grazing Land Management for TMDL IP (SL-6/SL-6T)	12	38	38	10	5	103
Livestock Exclusion with Riparian Buffers (LE-1T)	12	38	39	11	5	105
Small Acreage Grazing System (SL-6A)	2	5	5	1	1	14
Livestock Exclusion with Reduced Setback (LE-2/LE-2T)	2	5	5	1	1	14
Stream Protection/Fencing (WP-2/WP-2T)	2	5	5	1	1	14

Proposed Pasture BMPs:

- Vegetative cover on critical areas was proposed for 5% of pastureland in Bradshaw Creek and Unimpaired North Fork, 20% in North and South Fork, and 10% in Wilson Creek.
- Reforestation of erodible pasture was proposed for 5% of pastureland in Bradshaw Creek and Unimpaired North Fork, and 10% in North Fork, South Fork, and Wilson Creek.
- The varying percentages reflect the bacteria and sediment reductions required in the respective subwatersheds.
- Then, pasture management was applied to the remaining unconverted land.

When bacteria reductions could not be met with the BMPs listed above, an acreage of wet detention ponds was proposed.

Table 5-4: Proposed Pasture BMPs (acres-installed)

BMP	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Total (acres-installed)
Vegetative Cover on Critical Areas (SL-11)	36	2,208	2,587	41	145	5,017
Reforestation of Erodible Pasture (FR-1)	37	818	958	43	81	1,937
Woodland Buffer Filter Area (FR- 3)	36	368	431	41	36	912
Pasture Management (EQIP 528, SL-10T)	177	7,360	8,622	411	727	17,297
Grazing Land Management (SL-9)	176	176	176	176	176	880
Wet Detention Pond (acres treated)	0	3,800	1,720	0	330	5,850

Stream Restoration BMPs:

- A sediment reduction of 14,045 tons/year was required from instream erosion. This value was determined by the percentage of the benthic watershed this implementation plan is covering.
- The sediment reduction requires 90,613 feet of stream restoration throughout the second Roanoke River TMDL IP study area, based on the reduction rate of 310 lbs/ft/year.

Distribution of the load by stream miles in each subwatershed can achieve the restoration values.

Table 5-12: Planned and Proposed Stream Restoration Lengths				
Subwatershed	**Total Estimated Stream Length for Restoration (feet)**	**Planned, Ongoing, Completed Projects (feet)**	**Additional Proposed Stream Restoration (feet)**	**Additional Proposed Stream Stabilization (feet)**
Bradshaw Creek	9,844	0	9,844	492
North Fork Roanoke River	22,793	6,785	16,008	1,140
South Fork Roanoke River	48,140	0	48,140	2,407
Unimpaired North Fork Roanoke River	6,063	0	6,063	303
Wilson Creek	3,773	0	3,773	189

- **Proposed Follow-Up Water Quality Monitoring**

Station ID (DEQ)	Stream Name	Station Description	Station Type
4ARSF002.20	South Fork Roanoke River	Private Bridge above Green Hill	Water Chemistry
4ARSF011.73	South Fork Roanoke River	Rt. 637 Bridge at Gage	Water Chemistry
4ARSF014.02	South Fork Roanoke River	Persimmon Road Bridge	Water Chemistry
4ARSF___.__	South Fork Roanoke River	Station Location TBD	Aquatic Life & Field Data
4AGOS000.71	Goose Creek	Along Rt. 653	Water Chemistry
4ABDC002.36	Bradshaw Creek	Rt. 629 BRIDGE	Water Chemistry
4ACDN000.01	Cedar Run	Confluence of Cedar Run and Wilson Cr.	Water Chemistry
4ARNF013.66	North Fork Roanoke River	Rt. 603 Bridge near Ellett (Montgomery Co.)	Water Chemistry
4ARNF015.22	North Fork Roanoke River	Upstream of Wilson Cr. crossing / downstream of RR Crossing	Aquatic Life & Field Data
4ARNF016.80	North Fork Roanoke River	Taylor Hollow Road / Rt. 712 Bridge	Water Chemistry
4AWLN000.40	Wilson Creek	Rt.603 Bridge (Montgomery Co.)	Water Chemistry
4AROA227.42	Roanoke River	Rt. 773 at Gaging station in Lafayette	Water Chemistry
4AROA224.54	Roanoke River	Rt. 639 Bridge near Dixie Caverns (Roanoke Co.)	Aquatic Life & Water Chemistry

Public Comment Period: July 14, 2016 – August 15, 2016

Send written comments to:

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